

What is claimed is:

1. Apparatus for generating a pressurized hot water pulse and delivering it to a hot water utilization station such as a coffee or tea brewing station comprising:

an inlet for water, said inlet being adapted to be closed during the delivery of a pressurized hot water pulse;

an outlet having a hot water intake port and a hot water conduit for directing a pressurized hot water pulse to a hot water utilization station;

a pulse generator connected to said inlet and outlet, said pulse generator comprising a water heating chamber for receiving a predetermined amount of water via said inlet and for heating the water therein to produce sufficiently hot water for the hot water utilization station, a pressurization chamber for vaporizing water to generate pressurized steam to deliver under pressure said hot water in said heating chamber as a pressurized hot water pulse to the utilization station through said outlet, and a heating system for the heating and the vaporization of the water in said pulse generator, said heating chamber having a first end adapted to receive pressurized steam and a second end close to said hot water intake port;

wherein said pressurization chamber is adapted to provide pressurized steam to said first end of said heating chamber in such a manner that substantially no interaction occurs between the pressurized steam and the hot water between said first and second ends of said heating chamber during the delivery of a pressurized hot water pulse, thereby substantially preventing the overheating of the hot water by the pressurized steam during the delivery of the pressurized hot water pulse to the utilization station; and

wherein said pulse generator is adapted to cause water to flow into said pressurization chamber from at least one of said water heating chamber and said inlet for the generation of the pressurized steam in said pressurization chamber by said heating system.

2. Apparatus as defined in claim 1 further comprising a reservoir connected to said inlet for a supply of water and a filling valve for said inlet, said filling valve being adapted to allow the water in said reservoir to fill said pulse generator when pressure therein falls below a predetermined pressure after the delivery of a pressurized hot water pulse, thereby rendering said generator ready for the generation of a next hot water pulse, and to prevent the reverse flow during the delivery of the pressurized hot water pulse.

3. Apparatus as defined in claim 2 further comprising a pressure controller adapted to cause said heating system to stop supplying electric heat to said pressurization chamber substantially before a pressurized hot water pulse is completely delivered to the utilization station to prevent generation of steam pressure when said filling valve causes refilling of said heating chamber, thereby enabling said pulse generator to function as a metering pump to meter one pressurized hot water pulse, whose water volume approximately equates the volume of said heating chamber, to the station at a time.

4. Apparatus as defined in claim 1 further comprising a lid adapted to close and lock to said inlet to allow the buildup of steam pressure in said pulse generator and prevent said lid from being dislodged by the steam pressure.

5. Apparatus as defined in claim 1 wherein said pressurization chamber is adapted to receive a substantially larger amount of water than the amount of water needed to provide the volume of pressurized steam for delivering the pressurized hot water pulse, and is adapted to allow only about 1% to 60% of the received water to evaporate into pressurized steam and to force the other 40% to 99% of the received water as cleansing hot water into said water heating chamber, thereby enabling said pressurization chamber to be cleaned by said cleansing hot water every time when a pressurized hot water pulse is delivered.

6. Apparatus as defined in claim 1 wherein said pressurization chamber is adapted to have such a small volume for receiving water from one of said water heating chamber and inlet that said heating system can heat this small volume of water to generate steam pressure in seconds, thereby enabling said pulse generator to start delivering a pressurized hot water pulse substantially instantly after said heating system starts supplying electric heat to said pressurization chamber.

7. Apparatus as defined in claim 1 further comprising a passageway adapted to allow the hot water in said heating chamber to flow into said pressurization chamber as the water in said pressurization chamber is evaporated and a steam outlet connecting said pressurization chamber to a steam utilization station, thereby enabling continuous supply of pressurized steam to the steam utilization station.

8. Apparatus as defined in claim 1 wherein said pulse generator further comprises a sleeve for dividing said generator into said pressurization chamber and said water heating chamber.

9. Apparatus as defined in claim 8 wherein said pressurization chamber is formed between said sleeve and the side wall of said pulse generator, and comprises a top opening for directing the pressurized steam to said first end of said water heating chamber, an evaporation chamber for said heating system to generate the pressurized steam and a chamber bottom.

10. Apparatus as defined in claim 9 wherein said pressurization chamber further comprises a lower opening located at or near said chamber bottom for allowing part of the water in said pressurization chamber to be forced into said heating chamber by the differential pressure between said chambers, said lower opening being substantially more resistive to flow than said top opening.

11. Apparatus as defined in claim 9 wherein said pressurization chamber further comprises a steam distributor having a distribution chamber for receiving the pressurized steam from said evaporation chamber, a plate member located between said distribution chamber and said first end of said water heating chamber, and a plurality of openings on said plate member for distributing the pressurized steam to the hot water surface in said heating chamber.

12. Apparatus as defined in claim 1 wherein said pulse generator further comprises a steam distributor located between said pressurization chamber and said first end of said water heating chamber, said distributor having a plate member and a plurality of openings on said plate member for distributing the pressurized steam to the hot water surface in said heating chamber and minimizing the mixing between the pressurized steam and the hot water.

13. Apparatus as defined in claim 1 further comprising a reservoir for a supply of water and a pump connected to said inlet and said reservoir for delivering water from said reservoir into said pulse generator.

14. Apparatus as defined in claim 1 wherein said pressurization chamber is located in or above said first end of said water heating chamber and said heating system comprises an electric heater for the evaporation of the water in said pressurization chamber, thereby allowing the pressurized steam to be generated directly at or above said first end of said water heating chamber.

15. Apparatus as defined in claim 14 wherein said water heating chamber comprises a water heating tube, a delivery heater located along said water heating tube for heating the water in said tube, and a heating controller for said second heater for maintaining the water in said tube sufficiently hot for the hot water utilization station prior to the delivery of the hot water as a pressurized hot water pulse to the station, said water heating tube having a sufficiently small cross-section to allow the hot water/steam interface in said tube to adopt substantially the shape of the cross-section of said tube.

16. Apparatus as defined in claim 1 wherein said heating system comprises at least one electric heater, a heating controller for maintaining the hot water in said water heating chamber sufficiently hot prior to the delivery of a pressurized hot water pulse, and a pressure controller for controlling the steam pressure during the delivery of the pressurized hot water pulse.

17. Apparatus as defined in claim 16 wherein said outlet comprises a hot water intake port located a predetermined distance above the bottom of said water heating chamber to prevent the lower temperature hot water that precipitates to said bottom from entering said outlet, thereby increasing the hot water temperature at the start phase of a pressurized hot water pulse, and to prevent at least part of the hot water at the surface in contact with the pressurized steam from entering said outlet, thereby decreasing the hot water temperature at the end phase of the pressurized hot water pulse.

18. Apparatus as defined in claim 1 further comprising a water reservoir connected to said inlet, an filling valve for said inlet adapted to allow the water in said reservoir to fill said pulse generator at the end of a pressurized hot water pulse and to prevent the reverse flow during a pressurized hot water pulse, and a flow modulator for modulating the hot water flow in said heating chamber and obtaining a flatter hot water temperature vs. time profile in a pressurized hot water pulse.

19. Apparatus as defined in claim 1 further comprising a second pulse generator, wherein said outlet of said pulse generator is connected to one of the inlet and outlet for said second pulse generator to enable a selective delivery of the hot water in either one of or both said generators, thereby providing the user a choice of delivering a small or a large portion of hot water to the hot water utilization device.

20. Apparatus for preparing a beverage such as coffee or tea with a hot water pulse comprising:
an inlet adapted to receive water from one of a reservoir and an in-house plumb system;
an outlet for directing a hot water pulse into a container containing a supply of flavor-containing materials adapted to provide a drink when interacted with hot water;

a pulse generator connected to said inlet and outlet for producing and delivering a hot water pulse, said pulse generator comprising a chamber for receiving an predetermined amount of water via said inlet and a heating system for heating the water in said chamber and generating steam pressure to deliver the resulting hot water under pressure through said outlet as a hot water pulse into the container;

a filling valve for said inlet for allowing water to fill said chamber, said filling valve being adapted to move to a first position to allow water to automatically fill said chamber when the pressure in said chamber falls below a predetermined pressure after the delivery of a hot water pulse, thereby rendering said pulse generator ready to generate a next pressurized hot water pulse, and to move to a second position to prevent the reverse flow during the delivery of said hot water pulse under pressure;

a heating controller adapted to cause said heating system to heat the water in said chamber when the water temperature falls below a first temperature and to prevent said heating system from further heating the water when the water temperature reaches a second temperature, thereby maintaining said predetermined amount of water between said first and second temperatures;

a pressure controller adapted to cause said heating system to produce pressurized steam in said chamber to deliver the hot water therein under pressure as a hot water pulse through said outlet to the container and to prevent said heating system from further heating said chamber when the chamber temperature reaches a third temperature, said third temperature being substantially above said first and second temperatures; and

wherein said pulse generator and pressure controller are adapted to prevent the residual heat in said pulse generator from generating any significant steam pressure in said chamber after said filling valve opens to cause a next predetermined amount of water to automatically fill said chamber, thereby preventing the delivery of any premature water pulse of insufficient or lukewarm temperature to the container and enabling said pulse generator to function as a metering device to meter one hot water pulse, whose water volume approximately equates the volume of said chamber, to the container to interact with the supply of flavor-containing materials to produce a drink.

21. Apparatus as defined in claim 20 wherein said heating system comprises a heating heater for heating said predetermined amount of water in said chamber and a delivery heater for generating steam pressure to deliver the resulting hot water in said chamber as a hot water pulse into the container, wherein said heating controller is for controlling said heating heater to maintain said hot water between said first and second temperatures and said pressure controller is for controlling said second heater to control the delivery of the hot water pulse.

22. Apparatus as defined in claim 21 wherein said heating controller and pressure controller are adapted to allow only one of said heating heater and delivery heater to operate at any time, thereby preventing water overflow into the container by said second heater during the period of maintaining said hot water between said first and second temperatures and preventing further heating of the water by said heating heater during the period of delivering said hot water pulse to the container.

23. Apparatus as defined in claim 21 said heating controller comprises a first thermostat for controlling said heating heater to maintain the hot water in said chamber between said first and second temperatures and a second thermostat adapted to disallow said pressure controller to turn on said delivery heater when the water in said chamber is below approximately said first temperature and to allow said pressure controller to turn on said delivery heater when the water in said chamber rises to approximately said first temperature, thereby preventing the delivery of the hot water pulse until the water in said chamber reaches said first temperature.

24. Apparatus as defined in claim 21 wherein said heating controller comprises a thermostat having a first switch for controlling the electricity to said heating heater and a second switch for controlling said pressure controller, said thermostat being so constructed that only one of said first and second switches can be at the 'on' or 'close' position at a time.

25. Apparatus as defined in claim 20 wherein said pressure controller comprises a thermostat having an activation beam, said thermostat being adapted to move automatically from its 'on' position to its 'off' position when the chamber temperature reaches said third temperature to cause said heating system to stop supplying heat to said pressurization chamber, but to move from said 'off' position to said 'on' position only after said activation beam is pressed or turned.

26. Apparatus as defined in claim 25 wherein said pressure controller further comprises an electrical switch coupled to said activation beam in such a way that the action of turning on said switch will cause said thermostat to move to its 'on' position.

27. Apparatus as defined in claim 20 wherein said heating system comprises an electric heater for both heating the water in said water heating chamber and producing pressurized steam in said pressurization chamber, said heater being controlled by said heating controller and pressure controller.

28. Apparatus as defined in claim 27 wherein said heating controller comprises a first thermostat for maintaining the hot water in said chamber between said first and second temperatures and a second thermostat adapted to disallow said pressure controller to turn on said electric heater when the water in said chamber is below approximately said first temperature and to allow said pressure controller to turn on said electric heater when the water in said chamber rises to approximately said first temperature, thereby preventing the delivery of the hot water pulse until the water in said chamber reaches approximately said first temperature.

29. Apparatus as defined in claim 20 wherein said inlet comprises a sufficiently thin chamber or channel between the top part of said filling valve and said one of a reservoir and an in-house plumb system, said sufficiently thin chamber or channel being adapted to prevent the exchange of the hot in said chamber and the cold water in said one of a reservoir and an in-house plumb system during the period when said hot water is maintained between said first and second temperatures, thereby saving energy.

30. Apparatus as defined in claim 20 wherein said inlet comprises a material adapted to prevent the formation of scale on the wall surface of said inlet, thereby ensuring that said filling valve can freely move between said first and second positions.

31. Apparatus as defined in claim 20 wherein said heating system comprises an electric heater located in or close to the side wall of said chamber, and said chamber is constructed to have an aspect ratio of approximately 10 to 40 to cause said heater to generate steam at or near said side wall of said chamber and enable the steam to rise so quickly above the hot water in said chamber to build said steam pressure that the hot water away from said side wall is substantially not heated by said electric heater and by the steam.

32. Apparatus as defined in claim 20 wherein said heating system comprises an electric heater located between said filling valve and the top part of said chamber to allow said electric heater to generate steam directly at or near said top part of said chamber to build said steam pressure above the hot water in said chamber, thereby substantially preventing said heater and the steam from heating said hot water during the delivery of the hot water pulse through said outlet to the container.

33. Apparatus as defined in claim 20 wherein said pressure controller is adapted to turn off said heating system substantially before the complete delivery of the hot water pulse to the container to reduce the amount of steam to or even prevent steam from entering the container, thereby preventing the supply of flavor-containing materials including roasted coffee grounds from being burned by the steam.

34. Apparatus as defined in claim 20 further comprising a pressure relief valve comprising a valve chamber, a valve inlet having a top end a predetermined distance above the bottom of said valve chamber and a lower end connected to said pulse generator, a steam passage having a first end in communication with said valve chamber and a second end in communication with the atmosphere or reservoir, a valve member movable between a first position in which it opens said first end of said passageway and a second position in

which it closes said first end of said passage, and a drainage channel for allowing the water in said valve chamber to flow back into said pulse generator.

35. Apparatus as defined in claim 20 further comprises a sufficiently large volume of space between said outlet and the flavor-containing materials in the container to receive at least about 20% of the hot water in said chamber, said volume of space being adapted to allow the water therein to flow back into said pulse generator when there is substantially no steam pressure in said chamber.

36. Apparatus for preparing a beverage such as coffee or tea with a hot water pulse comprising:
an inlet adapted to receive water from one of a reservoir and an in-house plumb system;
an outlet for directing a hot water pulse into a container containing a supply of flavor-containing materials adapted to provide a drink when interacted with hot water;
a chamber for receiving an predetermined amount of water via said inlet;
an electric heater for heating said predetermined amount of water in said chamber;
a heater controller having a temperature sensing member in heat-conducting relation to said electric heater to sense the temperature of said heater, said controller being adapted to cause said electric heater to heat the water in said chamber when the sensed heater temperature is below a first temperature and to prevent said heater from heating the water when the sensed temperature reaches a second temperature, thereby maintaining the hot water in said chamber approximately between said first and second temperatures for a period of time prior to the delivery of a hot water pulse;
a delivery system for delivering at least part of the hot water in said chamber as a hot water pulse through said outlet to the container, wherein the hot water interacting with the supply of flavor-containing materials to provide a drink; and
a Delta temperature narrower having a first end in heat-conducting relation to said temperature sensing member and a second end extended to one of an air space and an object that are substantially cooler than said heater during said period of time prior to the delivery of the hot water pulse, said Delta temperature narrower being adapted to conduct heat away from said temperature sensing member at said first end to said one of an air space and an object at said second end at a such rate that the difference between said first and second temperature is substantially reduced, thereby substantially reducing the temperature variation of the hot water in said chamber prior to the delivery of a hot water pulse to the container by said delivery system.

37. Apparatus for generating a pressurized water pulse and delivering it to a water utilization station comprising:
an inlet adapted to receive water from a water reservoir;
a filling valve for said inlet;
an outlet for directing a pressurized water pulse to a water utilization station;

a pulse generator connected to said inlet and outlet, said pulse generator comprising a water chamber for receiving an amount of water from the reservoir via said inlet, a pressurization chamber for heating and vaporizing water to generate pressurized pressure for delivering the water in said water chamber as a pressurized water pulse through said outlet to the utilization station, and a heating system for the heating and vaporization of water in said pulse generator, said water chamber having a first end adapted to receive the pressurized steam from said pressurization chamber and a second end near the water intake port of said outlet;

wherein said filling valve is adapted to open to allow water to enter said pulse generator when the pressure in said water chamber falls below a predetermined pressure after the delivery of a pressurized water pulse and to prevent the reverse flow during the delivery of said pressurized water pulse to the water utilization station;

wherein said generator is adapted to allow said pressurization chamber to provide pressurized steam to said first end of said water chamber substantially without disturbing the water located between said first and second ends of said water chamber, thereby substantially preventing the pressurized steam from heating the water between said first and second ends of said water chamber during the delivery of the pressurized water pulse; and

wherein said pressurization chamber is adapted to receive water from at least one of said water chamber and said filling valve for the generation of the steam in said pressurization chamber by said heating system.

38. Apparatus as defined in claim 37 wherein said pressurization chamber comprises an evaporation chamber to which said heating system supplies heat to generate pressurized steam therein and a chamber opening adapted to allow water from said at least one of said water chamber and said filling valve to enter said evaporation chamber, said chamber opening being also adapted to direct the pressurized steam in said evaporation chamber to said first end of said water chamber.

39. Apparatus as defined in claim 38 wherein said pulse generator further comprises a steam distributor located between said pressurization chamber and said first end of said water chamber, said distributor having a plate member and a plurality of openings on said plate member for distributing the pressurized steam from said evaporation chamber to said first end of said water chamber.

40. Apparatus as defined in claim 37 wherein said pressurization chamber is located between said filling valve and said first end of said water chamber.

41. Apparatus as defined in claim 40 wherein said water chamber comprises a tube comprising at least a section of bent tube, said tube being adapted to keep the interface between the water and pressurized steam in said tube substantially intact during the delivery of a pressurized water pulse, thereby minimizing the heating of the water in said tube by the pressurized steam.

42. Apparatus as defined in claim 37 wherein said water chamber comprises a plurality of slim chambers, each of which has a top opening in communication with said inlet and a bottom opening in communication with said outlet, for reducing convective flow of the water, thereby preventing or reducing the heating of the water by the pressurized steam in said water chamber.

43. Apparatus as defined in claim 37 wherein said pressurization chamber is adapted to receive a substantially larger amount of water than the amount of water needed to provide the volume of pressurized steam for delivering a pressurized water pulse, and is adapted to allow only about 1% to 60% of the received water to evaporate into pressurized steam and to force the other 40% to 99% of the received water as cleansing water into said water chamber, thereby enabling said pressurization chamber to be cleaned by said cleansing water every time when a pressurized water pulse is delivered.

44. Apparatus as defined in claim 37 further comprising a filling assistant valve located between said water intake port of said outlet and the water utilization station for making the fluid flow from the water utilization station or atmosphere into said water chamber sufficiently resistant to allow at least part of said water chamber to be filled with the water from the reservoir through said inlet after the water in said chamber is delivered by the pressurized steam to utilization station as a pressurized water pulse.

45. Apparatus as defined in claim 37 wherein said pressurization chamber is adapted to restrict water from entering said pressurization chamber until said water chamber is filled to a predetermined level by water from the reservoir via said filling valve.

46. Apparatus as defined in claim 37 wherein said pressurization chamber and heating system are adapted to cause the amount of pressurized steam generated in said pressurization chamber to be sufficiently small that substantially no or little pressurized steam reaches the water utilization station at the end of a pressurized water pulse, thereby preventing potential risks a pressurized steam may cause.

47. Apparatus as defined in claim 37 further comprising a decoration station including at least one of a water fall, a water volcano, a water column and a water fountain as the water utilization station.

48. Apparatus as defined in claim 37 further comprising a cleaning device including one of a dental device, a dish washing device, a floor cleaning device and a cloth washing device as the water utilization station.

49. Apparatus for extracting a supply of flavor-containing materials such as roasted coffee grounds with a pressurized hot water pulse comprising:

a reservoir for containing a supply of water;

a brew head adapted to form a water-tight seal to a container that is adapted to cause extraction of a supply of flavor-containing materials therein by a pressurized hot water pulse to provide a beverage;

an inlet connected to said reservoir;

an outlet for directing a pressurized hot water pulse to said brew head for said extraction of the supply of flavor-containing materials;

a water heating chamber connected to said inlet for receiving a predetermined amount of water from said reservoir, said water heating chamber comprising a heating system for heating said predetermined amount of water and a controller adapted to cause said heating system to heat the water in said chamber when the water temperature falls below a first temperature and to prevent said heating system from heating the water when the water temperature reaches a second temperature, thereby maintaining the hot water in said heating chamber between approximately said first and second temperatures;

a pressurization chamber for generating steam pressure to deliver the hot water in said heating chamber as a pressurized hot water pulse via said outlet to the container to extract the flavor-containing materials under pressure to produce a beverage;

a filling valve for said inlet for allowing water to fill said heating chamber, said filling valve being adapted to open to allow water enter said heating chamber when the pressure in said heating chamber falls below a predetermined pressure and to prevent the reverse water flow during the delivery of said pressurized hot water pulse to the container, thereby allowing automatic filling and refilling of said heating chamber with water from said reservoir after the delivery of said pressurized hot water pulse; and

wherein said heating chamber and pressurization chamber are so configured that before said pressurization chamber provides steam pressure to said heating chamber, the hot water in said heating chamber has been heated to at least said first temperature, thereby ensuring said pressurized hot water pulse to be sufficiently hot for the extraction of the flavor-containing materials in the container.

50. Apparatus for providing both an under-sized hot water pulse and full-sized hot water pulse comprising:

an inlet for receiving water from a reservoir;

a pulse generator connected to said inlet for producing and delivering a hot water pulse, said pulse generator comprising a chamber for receiving via said inlet an amount of water from the reservoir, a heating system adapted to heat said amount of water in said chamber and adapted to generate pressurized steam for delivering the hot water as a hot water pulse, and a controller adapted to cause said heating system to generate said pressurized steam;

a filling valve for said inlet for allowing water to fill said pulse generator, said filling valve being adapted to open to allow water to enter said chamber when the pressure therein falls below a predetermined pressure after the delivery of a hot water pulse and to prevent the reverse flow during the delivery of said hot water pulse under pressure;

an outlet having a first hot water intake port located at a first predetermined distance above the bottom of said chamber, a second hot water intake port located at a second predetermined distance above the bottom

of said chamber, and a selection valve for a user to connect one of said first and second intake ports to a hot water utilization station, said second predetermined distance being substantially larger than said first predetermined distance; and

whereby in operation, when a user moves said selection valve to connect said first hot water intake port to the utilization station, the hot water between said filling valve and said first intake port in said chamber will be delivered as an undersized hot water pulse to the utilization station, and when a user moves said selection valve to connect said second intake port to the utilization station, the hot water between said filling valve and said second intake port in said chamber will be delivered as a full-sized hot water pulse to the utilization station.

51. An apparatus as defined in claim 51 wherein said pulse generator is adapted to prevent the residual heat after the delivery of one of said undersized and full-sized hot water pulses from generating any significant steam pressure when said chamber is refilled with water from the reservoir, thereby preventing the delivery of any un-wanted premature or baby water pulse to the utilization station.

52. Apparatus for generating a pressurized hot water pulse and delivering it to a hot water utilization station comprising:

an inlet for receiving water from a reservoir;

an outlet for directing a pressurized hot water pulse to a hot water utilization station;

a pulse generator connected to said inlet and said outlet for producing and delivering a pressurized hot water pulse, said pulse generator comprising a water chamber for receiving an amount of water via said inlet from the reservoir and a heating system for heating said amount of water and generating steam pressure to deliver the hot water under pressure as a pressurized hot water pulse out of said outlet;

a filling valve for said inlet for allowing water to fill said pulse generator, said filling valve being adapted to open to allow water to enter said chamber when the pressure therein is below a predetermined pressure and to prevent the reverse flow during the delivery of said pressurized hot water pulse; and

a compact relief valve adapted to relieve the pressure in said pulse generator to cause said filling valve to refill said pulse generator after the delivery of a pressurized hot water pulse, said relief valve comprising a valve chamber, a valve inlet in communication with said pulse generator, a passageway having a first end in communication with said valve chamber and a second end in communication with the atmosphere or reservoir, and a valve member movable between a first position in which it opens said first end of said passageway and a second position in which it closes said first end of said passageway;

wherein said valve member being adapted to move to said first position even when said valve chamber is full of water; and

wherein said valve inlet is adapted to generate a sufficient force acting said valve member to move said valve member to said first end of said passageway to close said first end in the early phase of said pressurized hot water pulse.

53. An apparatus as defined in 53 wherein said valve member is adapted to be substantially heavier than water.

54. An apparatus as defined in 53 wherein said valve member is loaded by one of a spring and elastic forces to increase the effective weight of said valve member.

55. Apparatus for instantly generating steam and delivering it to a steam utilization station comprising:

an inlet for water;

a generator connected to said inlet for producing and delivering steam instantly, said generator comprising a water chamber for receiving an amount of water via said inlet, a pressurization chamber adapted to receive heat from a heating system for vaporizing water to generate steam and allowing the delivery of the steam therein to a steam utilization station;

wherein said pressurization chamber is adapted to contain a significantly smaller amount of water than said water chamber, thereby substantially reduce the amount of time needed to heat the water in said pressurization chamber to above boiling point to generate pressurized steam and enabling substantially instant delivery of steam to the steam utilization station; and

wherein said water chamber and pressurization chamber are adapted to allow the water in said water chamber to flow and feed into said pressurization chamber as the water in said pressurization chamber is vaporized into steam.

56. Apparatus as defined in claim 55 further comprising a reservoir connected to said inlet for a supply of water, a filling valve for said inlet and an outlet for the steam, said valve being adapted to allow the water in said reservoir to fill said generator and to prevent the reverse flow during the delivery of the steam.

57. Apparatus as defined in claim 55 further comprising a water reservoir, a pump connected to said inlet for delivering water from said reservoir into said generator, a heating system for heating the water in said chamber to produce hot water and for generating the pressurized steam in said pressurization chamber, and an outlet for directing the pressurized steam to a steam utilization station, said pump, inlet and outlet being adapted to allow said pump to deliver cold water into said chamber to displace and force the hot water via said outlet to a hot water utilization station.

58. Apparatus as defined in claim 55 further comprising an outlet for the steam and a lid adapted to close and lock to said inlet to allow the buildup of steam pressure in said pulse generator and prevent said lid from being dislodged by the steam pressure.

59. Apparatus as defined in claim 55 wherein said inlet is adapted to function also as an outlet for the steam.

60. Apparatus as defined in claim 55 wherein said generator is adapted to allow water to enter said pressurization chamber sufficiently rapidly to cause a sufficiently quick temperature decrease therein when said generator is filled with water from said inlet after said generator becomes empty, thereby generating a temperature shock to loosen the scale on the surface of said pressurization chamber, and wherein said pressurization chamber is a sufficiently narrow to cause sufficiently steam flow to carry said loosened scale out of said pressurization chamber.

61. Apparatus as defined in claim 55 wherein said pressurization chamber comprises an evaporation chamber to which said heating system supplies heat to generate pressurized steam, a chamber outlet for directing the pressurized steam to the steam utilization station, and a chamber inlet located substantially below the water surface in said water chamber to allow water to flow and feed into said pressurization chamber.

62. Apparatus as defined in claim 55 wherein said generator further comprises a sufficiently heat-insulating partition wall between said pressurization chamber and water chamber to prevent the steam and hot water in said pressurization chamber from heating the water in said water chamber.

63. Apparatus as defined in claim 55 wherein said generator further comprises a cover for the water in said water chamber, said cover being adapted to move up as the water chamber is being filled and move down as the water is evaporated in said pressurization chamber.

64. Apparatus as defined in claim 62 wherein said cover comprises a layer of liquid having lower density and substantially higher boiling point than water.